21839

National Library of Canada | Bibliothèque nationale du Canada

CANADIAN THESES ON MICROFICHE | THÈSES CANADIENNES SUR MICROFICHE

NAME OF AUTHOR/*NOM DE L'AUTEUR* Ike Donald MacKay

TITLE OF THESIS/*TITRE DE LA THÈSE* A Comparison Of The Effects Of Scales Down Soccer Games On Eight And Nine Year Old Boys.

UNIVERSITY/*UNIVERSITÉ* U. Of Alberta

DEGREE FOR WHICH THESIS WAS PRESENTED/ *GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE* Master Of Arts

YEAR THIS DEGREE CONFERRED/*ANNÉE D'OBTENTION DE CE DEGRÉ* 1974

NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* Dr. Stuart Robbins

Permission is hereby granted to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

L'autorisation est, par la présente, accordée à la BIBLIOTHÈQUE NATIONALE DU CANADA de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans l'autorisation écrite de l'auteur.

DATED/*DATÉ* Sept 8/74 SIGNED/*SIGNÉ* Ike Mackay

PERMANENT ADDRESS/*RÉSIDENCE FIXÉ* Ike MacKay
Berry Pt. Rd.
Gabriola Island, B.C.

NL-91 (11-73)

THE UNIVERSITY OF ALBERTA

A COMPARISON OF THE EFFECTS OF MODIFIED SOCCER GAMES ON EIGHT AND NINE YEAR OLD BOYS

by

IKE DONALD MACKAY

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

IN

THE DEPARTMENT OF PHYSICAL EDUCATION

EDMONTON, ALBERTA

FALL, 1974

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

THE UNDERSIGNED CERTIFY THAT THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH, FOR ACCEPTANCE, A THESIS ENTITLED "A COMPARISON OF THE EFFECTS OF MODIFIED SOCCER GAMES ON EIGHT AND NINE YEAR OLD BOYS" SUBMITTED BY IKE DONALD MACKAY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN THE DEPARTMENT OF PHYSICAL EDUCATION.

Stuart G Robb

SUPERVISOR

Halcott

RBALDERMAN

DATE: Aug 1 / 74

ABSTRACT

It was the purpose of this study to determine if, by playing scaled down soccer games, eight and nine year old boys would touch the ball more often, keep possession of the ball longer, run farther, and develop a more positive attitude toward soccer, than they would by playing regulation size soccer games.

The apparatus consisted of seven stop watches, seven recording pads, two "K & R Pedo" pedometers and a whistle.

Two pilot games were played (one by eight year old boys, and one by the nine year old boys), followed by eight study games alternately played by eight, and then nine year old boys. Six eight year olds and six nine year olds were randomly selected, and these boys were observed throughout all study games for the number of touches and possession time with the ball. A further two boys from each group of six were randomly selected to wear pedometers throughout all study games. Recordings were tabulated after each thirty minutes of play. Immediately after the first two study games the twelve observed boys were interviewed to try to determine their attitudes toward the study games.

The t score (two tailed) method of analysis was used. A matched pair design was adopted, and all three hypotheses were presented in the null form.

In general, eight and nine year old boys touched the ball significantly more times and kept possession of the ball significantly longer while playing scaled down soccer games, than while playing regulation size soccer games. There was no significant difference in distances travelled between games on both field sizes. The boys

expressed a fairly even preference to field size.

ACKNOWLEDGEMENTS

The writer would like to thank Dr. Stuart Robbins for accepting the positions of advisor and chairman, and for sacrificing a great many hours and considerable effort throughout the duration of this thesis. The writer would also like to thank Dr. R.B. Alderman and Dr. H. Scott, both of the University of Alberta, for serving on the examining committee.

I would like to thank Don and David Martin, Chris DeGrout, Dave and Joanne Kelpin, Peter Zachary, Don Shandley, and Rex Craig, for devoting many free summer evenings to recording data for this study. Thanks must also be extended to Mike Sails, who performed the task of referee in a very fair and effective fashion throughout all ten experimental soccer games.

I would like to thank Dr. C.C. Cook, Dr. M. Collis, Dr. J.D. Eckerson, and Dr. R.T. Wallace for without their combined support this thesis would not have been initiated.

I would like to thank Dr. F.L. Martens of the University of Victoria, for generously donating the facility necessary for the experimental portion of this thesis.

I would like to thank my parents (Mother and Uncle) for extending considerable patience and support throughout the duration of this study.

Finally, I would like to express my greatest thanks to all eight and nine year old boys who participated in this study. The enthusiasm and great character they displayed throughout all study games made the experimental portion of this thesis an extremely

pleasurable experience indeed.

TABLE OF CONTENTS

CHAPTER		PAGE
I	STATEMENT OF THE PROBLEM	1
	Introduction	1
	Purpose of the Study	1
	Limitations	2
	Delimitations	2
	Definition of Terms	4
	Touching the Ball	4
	Regulation Size Soccer Game	4
	Scaled Down Soccer Game	5
	Possession of the Ball	5
	Study Game	5
	Hypotheses	6
	Justification of the Study	6
II	REVIEW OF THE LITERATURE	9
	Introduction	
	Studies and Writings Involving Scaling Down Equipment and Games	9
	Studies and Writings Involving Scaled Down Equipment and Facilities Related to Soccer	13
III	METHODS AND PROCEDURES	15
	Subjects	15
	Field Size	15
	Apparatus	16
	Contingency Factors	17
	Testing Procedure	18
IV	RESULTS AND DISCUSSIONS	20
	Introduction	20
	Results Related to Number of Touches	21
	Analysis of First Half Results Related to Number of Touches	23
	Analysis of Second Half Results Related to Number of Touches	23
	Discussion of Data Related to Number of Touches	24
	Discussion of the Analyzed First and Second Half Data on Number of Touches	25
	Results Related to Possession of the Ball	26
	Analysis of First Half Results Related to Possession Time	27
	Analysis of Second Half Results Related to Possession Time	27
	Discussion of Data Related to Possession of the Ball	29
	Discussion of the Analyzed First and Second Half Data on Possession of the Ball	30

CHAPTER PAGE

Analysis of First Half Results Related to Distance Travelled 32
Analysis of Second Half Results Related to Distance Travelled 32
Discussion of Data Related to Distance Travelled 34
Discussion of the Analyzed First and Second Half Data on Distance Travelled 34
Results Related to Subject Interviews 37
Discussion of Interview Responses 38

V SUMMARY AND CONCLUSIONS 39
Summary 39
Conclusions 41
Recommendations for Further Study 42

BIBLIOGRAPHY 44
APPENDIX I - STUDY SOCCER FIELDS 45
APPENDIX II - RECORDING SHEET 47
APPENDIX III - INDIVIDUAL INTERVIEW RESPONSES 49
APPENDIX IV - SCHEDULE OF STUDY GAMES 55
APPENDIX V - INDIVIDUAL SCORE TOTALS FOR ALL STUDY GAMES 57
APPENDIX VI - RECORD OF STUDY GAME SCORES 63
APPENDIX VII - t SCORE CALCULATIONS 65

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
I	Tabulation of Mean Number of Touches for All Study Games	21
II	Graphic Representation to Show the Number of Touches	22
III	Tabulation of Mean Possession Time (Seconds) for all Study Games	26
IV	Graphic Representation to Show Possession of the Ball	28
V	Tabulation of Mean Distance Travelled	31
VI	Graphic Representation Related to Distance Travelled	33
VII	Interview Response Groupings	37

CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

In the past few decades an extremely limited quantity of published research has been reported in North America related directly to the sport of soccer. Over the same period of time, soccer has increased tremendously in popularity, particularly on an active participation level. This increase is most noticeable at the minor level. For example, in the City of Edmonton, Alberta, there are now roughly 7,000 children playing League soccer.

The following study was conducted in appreciation of the need for further work in this particular area of research.

Purpose of the Study

The purpose of this study was to examine the relative effects of young children playing soccer in a regulation soccer game when compared to playing in a scaled down soccer game. The following sub-problems were explored:

(1) To discover whether eight and nine year old boys touch the ball more often while playing in a scaled down soccer game than they do in a regulation game;

(2) to discover whether eight and nine year old boys keep possession of the ball longer in a scaled down soccer game than they do in a regulation game;

(3) to discover whether eight and nine year old boys run farther on a scaled down soccer field than they do on a regulation size soccer field; and

(4) to discover whether, by playing in a scaled down soccer

game, eight and nine year old boys will develop a more positive attitude toward soccer participation than they would by playing on a regulation size soccer field.

Limitations

Since this study was conducted on five separate days (every Tuesday and Thursday evening for a week and a half) then the diurnal variations could limit the study. Weather conditions could vary from one evening to the next, enough to seriously affect player performances. The chance factor of any one of the boys under observation playing well one evening, and poorly the next (or vice versa) could influence the study results. The chance factor of any of the non-observed players playing abnormally well or poorly on one evening could indirectly influence the performances of the studied players. Also the general environment surrounding each child could influence his game performance (parental motivation during one game being different than the motivation given him for another game).

A descriptive record of weather and playing conditions, as well as notations with respect to any abnormal parental motivation will be kept throughout all study games.

It will be impossible to attribute causal effects to the size of the field, number of players, or to the interaction between the two because of the experimental design. Any differences will relate to the modified soccer game compared to the regulation soccer game.

Delimitations

(1) The study was delimited by the number of games played. There were two pilot games, and eight study games. Four of the study

games were played on a regulation size soccer field (two played by eight year old boys, and two games played by nine year old boys), and the other four on a scaled down soccer field (two played by eight year olds, and two games were played by nine year old boys). (See Appendix IV).

(2) The study was delimited by using the same players for all ten experimental games.

(3) The study was delimited by using the same field area for all study games. The boundaries for the scaled down soccer field were positioned in close proximity to the boundaries of the regulation size soccer field. (See Appendix 1).

(4) The study was delimited by controlling the number of observers, the role of each observer, and the amount of training that each observer received. Only eight recorders were used throughout the study, and each recorder was responsible for observing one particular subject for the duration of each study game. All eight observers were trained equally prior to the study, and three observers were checked for reliability during the two pilot games.

(5) The study was delimited by restricting the number and age of all subjects observed, as well as the number and age of all non-observed players. This was done primarily for recording convenience. In the study group number one six subjects were recorded, and all players (twenty-two) were eight years of age. The same six subjects were recorded throughout the four study games played by group one. In study group two, six subjects were observed, and all twenty-two players were nine years of age. Because of the difficulty of administration and

scarcity of accurate testing equipment the number of subjects involved in the distance travelled in each study game was limited to two. This will, of course, limit the generalizability of the results but may provide useful insight and direction for further study.

(6) The study was delimited by using the same referee for all study games. This would ensure that all eight study games were controlled in the same fashion.

(7) The study was also delimited by the regulation of playing times for all study games. Each game was sixty minutes long, with a two minute rest period at half time.

Definition of Terms

Touching the Ball

Touching the ball was interpreted as meaning any situation in which a player under study touches or contacts the ball with any part of his body, the ball having been played last by a teammate or an opponent. Any time a player under study comes into contact with the ball for a second time in succession without the ball having been contacted by a teammate or an opponent in the interim, then this situation does not constitute a touch of the ball.

Regulation size soccer game

Since this study was conducted on two different size soccer fields, the term "regulation size soccer field" shall refer to a field one hundred and ten yards in length and seventy-five yards in breadth. The goals shall each have two upright posts, equidistant from the corner flags and eight yards apart (inside measurement), joined by a horizontal corssbar, the lower edge of which shall be eight feet from the ground. The bar used for a game played on a

regulation size soccer field shall be twenty-eight inches in circumference (a number "five" ball). The total number of players constituting a single team for play on this field shall number eleven.

Scaled down soccer game

Throughout the report of this investigation, the term "scaled down soccer field" shall refer to a lined playing area fifty yards in length and thirty-five yards in breadth. The two goals shall each have two upright posts, equidistant from the corner flags and four yards apart (inside measurement), joined by a horizontal crossbar, the lower edge of which shall be seven feet from the ground. The ball which shall be used for games played on this field will be twenty inches in circumference (a number "four" ball). The total number of players competing on each team will be eight.

Possession of the ball

Possession of the ball was interpreted as meaning any situation during a study game in which a player has touched the ball last, and still has the ball within playing distance of his body (no further than one yard away from his body). As soon as:

(1) another teammate or opponent touches the ball;

(2) the ball rolls further than playing distance away from the player in possession; or

(3) the ball rolls out of bounds;

then he will have lost possession of the ball.

Study Game

A study game was interpreted as meaning a game of soccer which has a total playing duration of sixty minutes, with a two-minute rest interval after thirty minutes of play.

Hypotheses

Three null hypotheses were presented in this study.

(1) If eight and nine year old boys play a sixty minute game on a scaled down soccer field, then each player will not touch the ball any more times, or fewer times, than he would during a sixty minute soccer game played on a regulation size soccer field.

(2) If eight and nine year old boys play a sixty minute soccer game on a scaled down soccer field, then each player will not keep possession of the ball for any greater or lesser amount of time than he would during a sixty minute game played on a regulation size soccer field.

(3) If eight and nine year old boys play a sixty minute soccer game on a scaled down soccer field, then each player will not run any greater or lesser distance than he would during a sixty minute soccer game played on a regulation size soccer field.

Also, an attempt was made to determine the attitude of boys eight and nine years of age toward study games played on both the regulation size soccer field, and the scaled down soccer field.

Justification of the Study

During the last ten years there has been a tremendous growth of soccer participation among Canadian boys, as demonstrated by the vast numbers of boys playing in minor soccer leagues. Unfortunately adults have, in the past, and are presently regulating soccer games and leagues for boys, based largely on adult concepts of rules and field dimensions. Therefore, Canadian boys are playing soccer in adult-conceived situations.

There is also an increasing awareness of the growth and

development characteristics of children. They are no longer being looked upon as miniature adults but rather as individuals with their own characteristics, existing at their own physical and mental growth levels. Such ideas challenge the philosophy that suggests that children should play games in identical fashion to adult professional procedures.

Many parents and coaches believed that in order for a child to reach professional excellence in sport in later life, he must participate in a particular sport at a very early age in life. Such beliefs are being challenged today in many circles, largely due to the fact that a large number of very outstanding professional athletes have not become involved in participation of their sport until twelve, thirteen, or even more years of age. Instead, there is an increasing awareness in educational psychology, education, and physical education of the need to structure games for children to meet the specific needs of children of specific age or developmental levels.

At present there is a tremendously high drop-out rate among Canadian boys playing soccer, and there are basic faults in the program which contribute to this very high rate. It is possible that the physiological and psychological requirements of a soccer game played on a regulation size soccer field are too extreme for young eight and nine year old boys, and that these heavy demands (large distances to run, large goals, etc.) could be a large contributing factor in the high rate of player drop-outs from juvenile soccer programs.

It is suggested that young boys would learn more about soccer and enjoy playing the game more by touching the ball many times during a game than only a few times (it would lead to increases in

player skill and motivation). Increases in skill and motivation will occur more rapidly and extend to a higher level if young boys keep possession of the ball during a game for a long period of time, than if they keep possession of the ball for a short period of time. Also, within limits, it would be more desirable for young boys to run a greater distance during a soccer game than a lesser distance (provided other variables such as possession time with the ball and motivation levels are kept constant).

Soccer is a sport which can benefit a young boy in many ways (both physically and psychologically), and therefore is a sport worthy of further study. But the recent spread of the game of soccer and the quality of play may be severely limited if studies are not carried out related to teaching the game to children.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

In this chapter, the relevant literature directly related to the research problem has been reviewed. Studies and writings concerning the scaling down of equipment and games in general (not specifically concerned with the sport of soccer) were reviewed first. Studies with emphasis on scaled down equipment related directly to soccer were considered next.

It will become obvious that there has been little study executed in this area to date. Most of the work so far has been conducted during the last two years.

Studies and Writings Involving Scaling Down Equipment and Games

The need to scale down equipment and games to meet the special needs of children has been reported by a number of researchers and writers in physical education. Singer (1972) mentions that Little League Baseball was formed in Williamsport, Pennsylvania in 1939. He notes that many facets of baseball, such as facility and equipment dimensions were scaled down to satisfy the size and ability limitations of boys between eight and twelve years of age.

Orlick (1973) reported that for ten years China has been operating on scaled down playing situations for children (three to six years of age) in sports such as basketball, soccer, badminton, ping pong, and volleyball. He maintains that the scaling down techniques are proving beneficial because "the reduction in the size of the

equipment enabled children to have successful sports experiences at an early age." (Orlick, 1973-A, p.22).

Glassford and Clumpner (1973) also noted the Chinese technique of scaling down facilities and equipment size to suit the age group. They reported the usage of three different sizes of basketballs, and several sizes of soccer balls. Also soccer field and goal reductions, lowering of basketball hoops (1.75 metres), and the scaling down of ping pong tables were specifically mentioned.

Glassford (1973) expressed a need for scaling down equipment and facilities for Canadian children, and mentioned that:

> The only sport that has shown that it is aware of the difficulties which youngsters face in skill acquisition relative to size of equipment and environmental structure is Little League Baseball where the size of the ball, the size of the bat, the size of the diamonds have all been reduced. In this way the youngster is better able to master the situation and to improve in his skill acquisition. (Glassford, 1973, p.5).

He also mentioned that "biddy" (or scaled down) basketball has begun to be introduced into Canada, but feels that it could be more completely scaled down than its present form.

Morell (1973) discovered that in Canada, of three team sports (basketball, soccer and hockey) only basketball indicated that it officially promoted a revised set of rules for youngsters (Mini-Basketball). The Canadian Amateur Hockey Association stated that its provincial branches or community leagues make some special rules for boys under twelve years of age. All official amateur hockey games must be played on a standard ice surface (at least 185 feet by 85 feet). The Canadian Soccer Association stated that it would like to see smaller facilities, but felt that availability is now a problem. The

rules for "Mini-Basketball" say that a regular court will be used, with a lower hoop and a smaller ball being used. Apart from the aforementioned material, none of the associations indicate that they see a need for changes in playing rules or in sizes in equipment and facilities. Morell also indicated that in Canada non-team sports more than team sports have provided for the individual differences of its competitors.

Bratton (Morell, 1973) outlined a suggested scaled down volleyball game for young boys (nine to twelve years of age). He suggests having three players on each team (as opposed to six). The court should be forty-four feet by seventeen feet (as opposed to sixty feet by thirty feet), and the net would be six feet six inches high (instead of seven feet eleven and five-eights inches). A smaller ball should be used and a few simple rule changes regarding spiking and blocking could be made to compensate for the fewer numbers. At present their suggestions have not been adopted for official use.

Singer (1973) mentions that "Desirable Athletic Competition, 1968" was a report drawn up by medical practitioners, physical educators, and recreation authorities in the United States to formulate guidelines for children under thirteen years who participate in competitive activities. These authorities collectively warned "against commercialization and overemphasis on athletics at this age level." They also recommended "Rule modifications and careful grouping of children according to their physical characteristics" (Singer, 1972, p.29).

Smith stated that:

> It is ludicrous to put preschool or even early elementary

> school children on a full sheet of ice and expect them to play under adult rules. Such youngsters should spend their time skating, handling the puck and shooting in what best can be described as hockey type activities. Gradually, the complexities of the game are introduced until after from two to four years of involvement the kids have developed sufficient personal skill, strength and endurance, understanding, and social awareness to be playing the adult version of the game. (Smith, 1972, p.5).

Ellis notes that many elementary and secondary school teachers have for a number of years:

> ... stressed the need to adapt their movement program, not just the equipment and facilities but the total learning environment, to meet the needs of the individuals in their care. Games need changes in numbers, rules, and structures according to the needs of the individuals involved, even to the extent of different groups in the same class playing different versions of the game on a given day. (Ellis, 1973, p.17).

Scott (1973) described a scaled down hockey program for boys six to ten years of age in Aspen Gardens, Edmonton. The program has been in effect since the fall of 1972, and constitutes dividing a normal ice surface into smaller units (two or three units, depending on the ages of participants). There are seven players on each team, and they play constantly for the entire hour. The response to the new program has been quite pleasing, although in isolated cases considerable pressure has been applied by parents and peers for the boys to play "real hockey" (or highly organized hockey played on a large ice surface with adult rules). According to Scott's subjective evaluation "the boys are developing basic hockey skills at a surprising rate, particularly their stopping, starting, and turning skills." (Scott, 1973).

Williams (1973) adopted a scaled down situation for rugby beginners which has been adopted by the Welsh Rugby Union. The field

size is reduced to seventy yards in length and forty yards in breadth. The goal uprights are only fifteen feet apart, with the crossbar standing eight and one-half feet from the ground. Also the number of players on each team has been changed from fifteen to only nine. By allowing small boys to play on a man-oriented rugby situation, Williams feels that:

> The result is nearly always depressing to watch - thirty players chasing the ball: little involvement - so few players touch the ball and consequently there are few opportunities for players to acquire and develop the fundamentals of the game. (Williams, 1973, p.74).

He also states that:

> It is quite ludicrous to see small boys trying to play on a pitch which was designed with men in mind. (Williams, 1973, p.76).

Studies and Writings Involving Scaled Down Equipment and Facilities Related to Soccer

Very little information is available regarding scaling down of facilities and equipment, specifically related to the sport of soccer.

Usher (1972) computed theoretical soccer ball, goal, and field sizes for boys fourteen, twelve, ten and eight years of age, based on the average height statistics for each group under study. When compared to the official measurements he concluded, for boys twelve years of age or less, the field dimensions should be 84.9 yards long and 50.2 yards wide, and the goal height should be six feet, with a width of 18.5 feet. He suggested that boys between the ages of twelve and fourteen should use a size "four" ball (eight inch diameter, and a 25-26 inch circumference), while boys of roughly ten

years of age should use a size "three" ball (7.5 inch diameter, and a 23-24 inch circumference). Usher also mentioned that very small eight year old boys should play with a number "two" ball (seven inch diameter, and a 21-22 inch circumference).

The growing interest in making experiences suitable for the age, aptitude, and ability of children is being reflected in the methods of coaching being recommended by the English Football Association. They are utilizing a system of coaching based on a grid, or series of ten yard squares in which realistic, game-like situations can be duplicated on a small scale. Wade (1970) has adopted a number of skill development activities for use on a coaching grid. Best (1970) utilizes the coaching grid for a number of passing and dribbling development drills.

Very few studies have been carried out into the area of suitable facilities and equipment for young children. The current focus and the few related studies point to an interesting and important area of study.

CHAPTER III

METHODS AND PROCEDURES

Subjects

Forty-four boys aged eight and nine years (twenty-two eight year olds, and twenty-two nine year olds) were randomly selected from juvenile soccer team lists in Victoria, British Columbia. From the list of twenty-two eight year old boys, six boys were also again randomly selected. From the list of twenty-two nine year old boys, six boys were randomly selected. From the remaining sixteen boys, ten were randomly chosen to participate with the six boys selected in the modified soccer games. The six eight year old and six nine year old boys chosen previously would be observed throughout all study games. Two subjects from each group of six boys were again randomly selected, and these boys were fitted with pedometers throughout all study games.

Field Size

There were two playing areas chosen for the experimental soccer games, each situated by the other at the University of Victoria. One was a regulation size soccer field, and the other was a scaled down soccer field (see Appendix I). The fields were lined out in close proximity to each other to ensure that the players would be surrounded by virtually identical physical environments, and that they would be playing on grass surfaces of similar slope and texture.

The regulation size soccer field was one hundred and ten yards long and seventy-five yards wide. All other field measurements (goal size, penalty area, etc.) were in strict accordance with field

requirements listed in the F.I.F.A. "Laws of the Game" manual. This field size has regularly been used for juvenile games played by eight and nine year old boys.

The scaled down soccer field was fifty yards long and thirty-five yards wide. The goal dimensions were four yards in width and seven feet in height (which were subjectively chosen goal dimensions). The field area of the scaled down soccer field was made to be less than one-half that of the regulation soccer field in order to compensate for both the scaling down requirements necessary for the small size of the subjects, and the scaling requirements also felt necessary for the reduced number of players participating in experimental games (only eight-a-side, compared to eleven-a-side on the regulation field). The half way line was drawn twenty-five yards from each goal line. All other inside markings were exactly one-half the size of the markings on the regulation field (penalty spot was six yards out from the goal line, centre circle was five yard radius). This was done for the purposes of ease in field marking, and to roughly but adequately comply with the scaled down boundaries and goals.

Apparatus

In order to strictly control the duration of each study game, a stop watch was used. The watch was started as soon as the referee blew his whistle to begin each game. The stop watch was controlled by the head study recorder, and also regulated:

(1) the start of half time (thirty minutes from the start of the game);

(2) the end of half time (two minutes from the start

of half time); and

(3) at the end of the game (thirty minutes after the start of the second half of play).

A stop watch, pen, and recording sheet (see Appendix II) was issued to each observer prior to each game. The stop watch was used to record the possession time of each subject, and the pen and recording sheet were used to tabulate the number of touches of the ball made by each subject throughout the game.

Two "K & R Pedo" pedometers were each attached to specific subjects throughout each study game. The pedometers were hooked onto the right top rim on the boys' shorts, and were left hanging freely downward to ensure accurate operation of the instruments.

A master recording sheet was utilized by the head study recorder for the placement of player registrations, team lists, and all recorded data. A whistle was issued to the referee for use throughout all games, and red bibs were given to the players of one team before each study game.

A Sears Cassette tape recorder and cassette tape were used for subject interviews directly after the final two study games.

Contingency Factors

The weather throughout all experimental games was very uniform and pleasant. One day (August sixteenth) was cancelled due to severe rain, and was re-scheduled on August twenty-third, the following Thursday. There was no rain or strong wind on any other

days of experimentation. Also all games were played between six and eight o'clock in the evening. The field conditions were excellent and uniform throughout all study games.

Parental influence was deemed to be uniform throughout the study. The game scores at half time and the conclusion of each study game were recorded by the head study recorder. (See Appendix VI).

Testing Procedure

Two pilot study games were held on August seventh, two days prior to the start of the first study game. The first pilot game was played by eight yeard old boys, and the second by nine year old boys. These games were held primarily for player registration, selection of study players (and study players to wear pedometers), team allocations, and checking for reliability among recorders.

The head study recorder was responsible for installing and recording the pedometers (with readings taken at half time and full time of each study game), regulating game time with a stop watch, recording game scores (at half time and at the end of each game) and tabulating the combined results of all observers after each study game had ended.

Apart from minor exceptions, each individual randomly selected player was observed by the same recorder throughout all four study games. Each observer recorded: (a) the number of times throughout each study game that his (or her) subject touched the ball; and (b) the amount of time throughout each study game that his (or her) subject had possession of the ball. Each recorder handed in completed tabulations to the head study recorder after every study game.

Immediately after the last two study games (on August twenty-third) the head study recorder individually interviewed (and recorded with a cassette tape recorder) each subject, asking him ten pre-arranged questions, which were:

(1) How old are you now?

(2) How many years have you been playing organized soccer?

(3) Which sport do you enjoy playing the most?

(4) Did you enjoy playing these five soccer games here?

(5) Do you think that you improved over the five games?

(6) On which field did you play your best soccer?

(7) Which goal size do you like the best? Why?

(8) Do you like playing eight-a-side, or eleven-a-side soccer best?

(9) Was there anything that you didn't like about these games? What was it?

(10) Which field did you enjoy playing on the most? Why?

The collected data was then analyzed for the significance of the difference between means using a t-test, with the level of significance chosen at .05. The mean scores were analyzed for the number of touches on the regulation size soccer field compared to the scaled down soccer field. The mean scores were analyzed for the possession time on the regulation size soccer field compared to the scaled down soccer field. The mean scores were also analyzed for the distance travelled on the regulation size soccer field compared to the scaled down soccer field.

CHAPTER IV

RESULTS AND DISCUSSIONS

Introduction

The samples selected for this study were small. There were two samples consisting of six boys each, and two consisting of two boys each. In order to analyze these small samples, the t-test was adopted. A matched pair design was used to compare the significance of the difference between means of the same sample group (difference between the means of eight year old boys on two different field sizes, and the difference between the means of nine year old boys on two different field sizes). The three hypotheses used for the study were in the null hypothesis form, which assumes that there is no significant difference between two population means, and that any difference found between the sample means is due to chance. A two-tailed test was, therefore, used for analysis to determine whether or not there were any significant differences between the means of the small sample group scores on either side of the bell curve.

The five percent (.05) level of significance was chosen, for it was felt that this confidence level would be adequate for a study of this nature. It should be emphasized here that this study was not meant to be a carefully controlled and exact research project, but rather was adopted as a preliminary or exploratory study in its area, with the added goal of determining a reasonably high degree of scientific accuracy. There is an increasing need for field research and natural experiments. This controlled investigation,

although having many of the disadvantages of such research in which it is difficult to control all of the variables, has many advantages related to its practical application.

Results Related to Number of Touches

The following results were formulated under the topic areas of number of touches, possession time with the ball, and (if the subject was recorded) distance travelled. All twelve subjects were recorded over both a regulation size soccer field and a scaled down soccer field, and the following data was collected and is recorded.

TABLE I

TABULATION OF MEAN NUMBER OF TOUCHES FOR ALL STUDY GAMES

	Large Field			Small Field		
	1st Half	2nd Half	Total	1st Half	2nd Half	Total
8 Year Old Boys	20.0	13.0	33.0	28.91	24.27	53.18*
9 Year Old Boys	22.45	18.73	41.18	24.50	29.67	54.17
All Boys	21.225	15.865	37.09	26.705	26.97	53.675*

* = Significant at the .05 Level of Confidence

There were significantly more touches of the ball by eight year old boys, and by eight and nine year old boys combined when they played in the scaled down soccer games, compared with the regulation soccer games. Results for the nine year old boys were very close to significant, with a t score of 2.3726 (significance being 2.57). The results of eight year old boys, and eight and nine year old boys combined both reject the null hypotheses.

See Appendix V for individual scores on number of touches,

TABLE II

GRAPHIC REPRESENTATION TO SHOW THE NUMBER OF TOUCHES

possession time, and distance travelled (if applicable) that were recorded during the study games played on both field sizes.

Analysis of First Half Results Related to Number of Touches

	Large Field	Small Field	"t"
Eight Year Old Boys	20	28.91	2.90*
Nine Year Old Boys	22.45	24.50	1.16
All Boys	21.23	26.71	2.82*

*Significant at the .05 Level of Confidence.

In the first half of the study games, eight year old boys and eight and nine year old boys combined touched the ball significantly more times while playing scaled down soccer games, than while playing regulation size soccer games. There was no significant difference between the number of touches by nine year old boys in the regulation size soccer games, when compared with the scaled down soccer games. The significant results reject the null hypotheses.

Analysis of Second Half Results Related to Number of Touches

	Large Field	Small Field	"t"
Eight Year Old Boys	13.0	24.27	4.95*
Nine Year Old Boys	18.73	29.67	2.65*
All Boys	15.87	26.97	4.55*

*Significant at the .05 Level of Confidence.

In the second half of the study games, eight year old boys, nine year old boys, and both eight and nine year old boys combined touched the ball significantly more times during scaled down soccer

games, than during regulation size soccer games. These findings reject the null hypotheses.

Discussion of Data Related to Number of Touches

The t score at the .05 confidence level was significant for the number of touches by eight year old boys (rejecting the null hypotheses). There were significantly more touches of the ball by the eight year old boys during the games played on the scaled down soccer field than in the games played on the regulation size soccer field. It was felt that the smaller total number of players participating on the scaled down field (sixteen instead of twenty-two) and the smaller surface area of the small field were two possible main factors in increasing the number of touches significantly. The small field area could increase the number of touches for a boy in two ways: (1) restrict or limit the distance that the ball can legitimately remain away from the boy. In other words there is a high probability that the ball will remain relatively close to a boy throughout a game; and (2) the constant close proximity of the ball to the boy could increase his motivation to try to touch the ball.

The t score at .05 was not significant for the number of touches of nine year old boys. In other words, there was no significant difference between the number of touches of the ball when playing on the small field or on the large field. There were, however, more touches made by the boys on the scaled down field than on the regulation size field, and the t score calculated was very close to

being significant (2.3726, when 2.57 was needed for significance). It was felt that more accurate observation of study players, and a larger sample size could possibly have yielded a significant result.

The t score at 0.5 degrees of freedom for both eight and nine year old boys was significant. In other words, there were significantly more touches of the ball made by eight and nine year old boys when playing on a scaled down soccer field than when playing on a regulation size soccer field. The same basic factors were believed responsible for producting the significant results over both eight and nine year old games as were acting on the eight year old games (decreased number of players, less surface area which could increase player motivation and decrease the average distance of the ball to a player on the field).

Discussion of the Analyzed First and Second Half Data on Number of Touches

A t score analysis of data recorded in the first and second half of each study game was conducted under the headings of:

(a) eight year old boys

(b) nine year old boys

(c) all boys.

The first half t scores for the number of touches for eight year old boys, and both eight and nine year old boys combined showed that there were significantly greater touches recorded when playing on the scaled down field, in comparison to the touches recorded on the regulation field. It was felt that the touches were more significant on the small

field due to the decreased number of players participating and the smaller field area (which should keep the ball closer, on average, to individual players throughout the game.)

The second half analysis did produce a greater quantity of significant results. There were significantly more touches of the ball during the second half of play in study games held on the scaled down soccer field, than games held on the regulation size soccer field. These results were significant for eight year olds, nine year olds, and also both eight and nine year olds combined. One possible explanation for more significant results during the second half of study games could be that the boys became tired when playing on the large field and were not highly motivated to try to touch the ball, whereas when they played on the small field the ball was never very far away and the boys were therefore constantly motivated to touch the ball.

Results Related to Possession of the Ball

TABLE III

Tabulation of Mean Possession Time (Seconds) for all Study Games

	Large Field			Small Field		
	1st Half	2nd Half	Total	1st Half	2nd Half	Total
8 Year Old Boys	26.11	22.48	48.59	38.20	31.21	69.41
9 Year Old Boys	36.32	26.09	62.40	31.20	42.46	73.66*
All Boys	31.215	24.285	55.50	34.70	36.835	71.535*

*Significant at the .05 Level of Confidence.

There was significantly more possession time with the ball by nine year old boys, and eight and nine year old boys combined during games played on the small field, when compared to study games played on the large field. Both of these findings reject the null hypotheses.

Analysis of First Half Results Related to Possession Time

	Large Field	Small Field	"t"
8 Year Old Boys	26.11	38.20	1.73
9 Year Old Boys	36.32	31.20	0.23
All Boys	31.21	34.70	.058

*Significant at the .05 Level of Confidence

There were no significant differences between study games for eight year old boys, nine year old boys, and eight and nine year old boys combined, when comparing possession time on the small field to possession time with the ball on the large soccer field. These findings are in support of the null hypotheses.

Analysis of Second Half Results Related to Possession Time

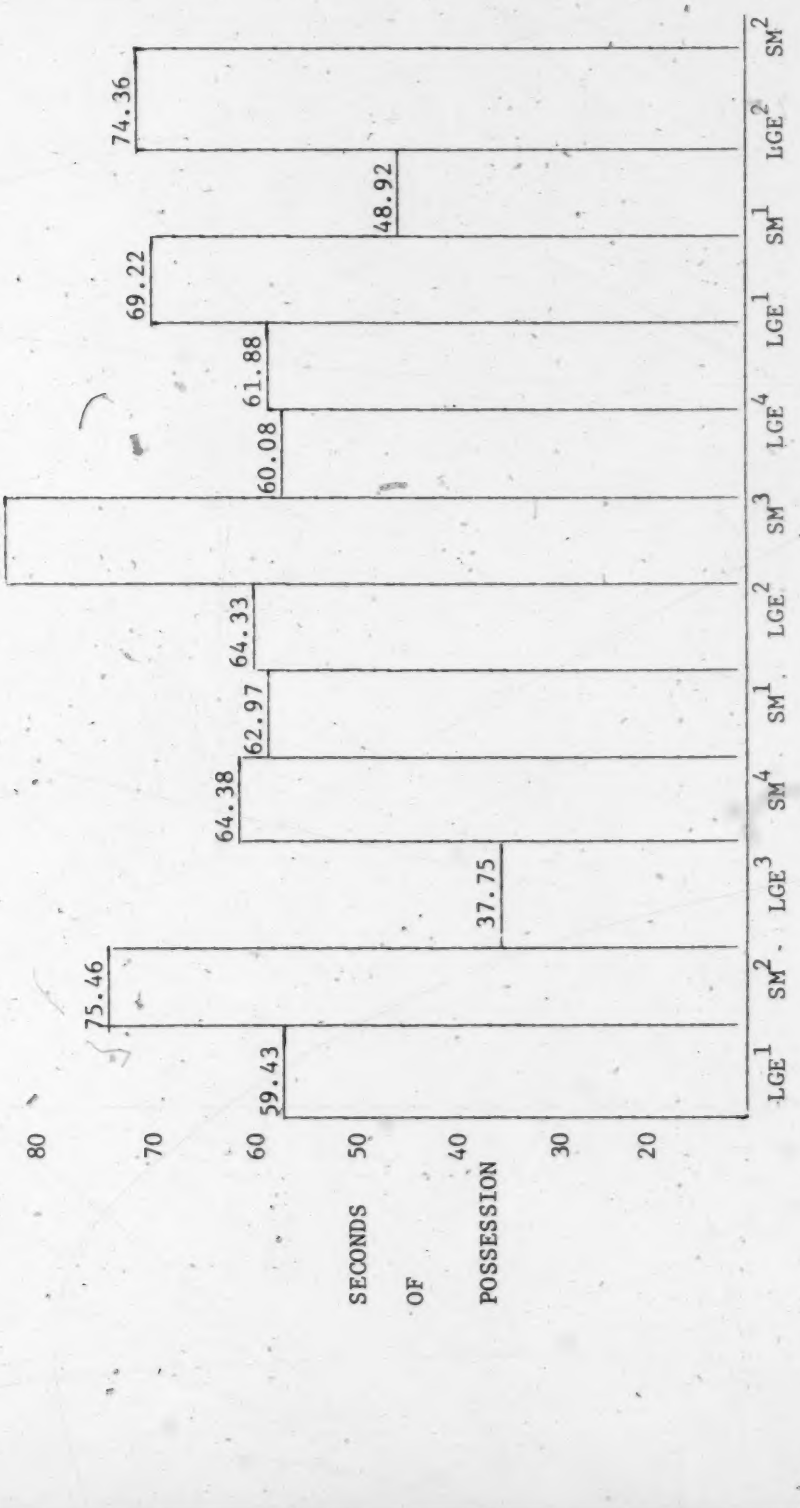
	Large Field	Small Field	"t"
8 Year Old Boys	22.48	31.21	1.50
9 Year Old Boys	26.09	42.46	2.79*
All Boys	24.285	36.835	3.05*

*Significant at the .05 Level of Confidence.

Nine year old boys, and eight and nine year old boys combined kept possession of the ball significantly longer during scaled

TABLE IV

GRAPHIC REPRESENTATION TO SHOW POSSESSION OF THE BALL



down soccer games, than they did while playing regulation soccer games. These two findings reject the null hypotheses. There was no significant difference between the possession time of eight year old subjects playing in the scaled down soccer games, when compared to the regulation size soccer games.

Discussion of Data Related to Possession of the Ball

The recorded possession times of the six eight year old boys, when analyzed on a t test (at the .05 level of confidence) were found not to be significant, and the null hypothesis was supported. The boys did not record significantly greater or lesser possession time while playing on the scaled down soccer field, than when they played on the regulation size soccer field.

The t score computed (2.3119) at the .05 level of confidence was very close to the score of 2.571 which was required for significance. It was felt that, with a larger sample, more study games, and more precise recording, the results could quite likely have shown significantly greater possession time during the games played on the smaller field than during the games played on the regulation field. Also subject number six held the soccer ball in his hand for a throw-in during study game number three (large field) for twenty seconds before releasing it. This unusual and prolonged possession interval could possibly have been a major contributing factor in producing a non-significant possession score.

The null hypothesis was rejected by the t score results for nine year old boys. There was significantly longer possession time with the ball when the boys played on the scaled down field,

than when they played on a regulation size field. It was felt that the results would have been even more significant had subjects number eleven and twelve participated in typical, or regular, fashion. But on this particular day both boys remained very isolated from play, and preferred to talk to each other, behaviour which was far removed from that displayed during other study games.

The null hypothesis was also refuted by the t score results obtained for the combined possession time of eight and nine year old boys when they played on the scaled down soccer field, than when they played on the regulation size soccer field. It was felt that the main contributing factors to the increase in individual possession time on the small field were: (1) the smaller number of players (sixteen, compared to twenty-two for the large field) which should give individual players possession of the ball for a greater percentage of time throughout each game; and (2) the smaller field area, which should keep the ball within reasonably close proximity to each player, thereby motivating him to continue efforts to regain possession of the ball.

Discussion of the Analyzed First and Second Half Data on Possession of the Ball

A t score analysis of data recorded in the first and second half of each study game was conducted under the headings of:

(a) eight year old boys

(b) nine year old boys

(c) all boys.

There were no significant differences in possession time with the ball during scaled down soccer games when compared to regulation size soccer games. It was felt that insufficient sample size, a small number of study games, and possibly error in recording could conceivably be responsible for non-significant results of such quantity. Also the freshness of the players could possibly have given them the needed energy to produce results from the two field sizes that were very close to each other.

There was greater possession time with the ball recorded (for the nine year old boys, and the combined eight and nine year old boys) in the second half of the games played on the scaled down field. The significant results in the possession time for second half play would be explained by features such as the smaller playing area and reduced player numbers of the scaled down field.

Results Related to Distance Travelled

TABLE V

TABULATION OF MEAN DISTANCE TRAVELLED

	Large Field			Small Field		
	1st Half	2nd Half	Total	1st Half	2nd Half	Total
8 Year Old Boys	1.907	1.907	3.814	1.703	1.766	3.469
9 Year Old Boys	2.844	3.03	5.874	2.563	2.829	5.392
All Boys	2.376	2.469	4.845	2.133	2.298	4.431

*Significant at the .04 Level of Confidence.

There were no significant differences for any study group in distance travelled during scaled down soccer games, when compared

to regulation size soccer games.

Analysis of First Half Results Related to Distance Travelled

	Large Field	Small Field	"t"
8 Year Old Boys	1.907	1.703	-
9 Year Old Boys	2.844	2.563	1.509
All Boys	2.376	2.133	5.71*

*Significant at the .05 Level of Confidence.

There were no computably significant differences in distance travelled for eight year old boys and nine year old boys when comparing the two field sizes. Eight and nine year old boys combined did run significantly farther on the large soccer field than they did on the small soccer field. This finding rejects the null hypothesis.

Analysis of Second Half Results Related to Distance Travelled

	Large Field	Small Field	"t"
8 Year Old Boys	1.907	1.766	2.99
9 Year Old Boys	3.03	2.829	.639
All Boys	2.469	2.298	2.01

*Significant at the .05 Level of Confidence.

There was no significant difference in distance travelled by any subject group when playing scaled down soccer games, compared to regulation size soccer games. These findings are in support of the null hypothesis.

TABLE VI

GRAPHIC REPRESENTATION RELATED TO DISTANCE TRAVELLED

Discussion of Data Related to Distance Travelled

t score analysis of the collected data on distance travelled for eight year old boys, nine year old boys, and both eight and nine year old boys combined, found no significant differences in the distance travelled between games played on the scaled-down soccer field and the regulation size soccer field. The t score results at the .05 level of confidence (with 3 degrees of freedom) are in support of the null hypothesis.

It was felt that, on some testing days, the pedometers were not measuring as accurately as possible. This was particularly evident on August fourteen, which was the second day of testing. Both pedometers were replaced by new ones for the remaining two testing days (August 21 and August 23). It must be emphasized here that the fear of instrumentation error was only a subjective evaluation, based on observation of the subjects being tested during the study games.

One explanation of why the subjects did not run significantly further on the large field than on the small one could possibly be that (on average) the ball remained closer to individual players throughout games played on the scaled-down field because of the smaller field area. This factor could motivate the child into chasing after the ball, still covering similar distances during the game despite playing on a field area that is much smaller than the regulation size soccer field.

Discussion of the Analyzed First and Second Half Data on Distance Travelled

A t score analysis of data recorded in the first and

second half of each study game was conducted under the headings of:

(a) eight year old boys

(b) nine year old boys

(c) all boys.

The only first half data that was computed to be significant were results of the combined eight and nine year old subjects. These boys were found to have moved a significantly greater distance during the first half of study games played on the regulation size soccer field, when compared to the distance travelled during the first half of study games played on the scaled down soccer field. This phenomenon could possibly occur because during the first half the boys are relatively fresh, and are quite eager to take advantage of the wide spaces available on the larger field by moving about at a fairly brisk pace.

All other first half data was analyzed and found to be not significant, therefore supporting the null hypothesis.

In the second half of all study games there were no significant distances travelled by any study group when game results on the small and large fields were compared. These findings are in support of the null hypothesis.

It was felt that the large nature of the regulation field tends to tire out the boys, enough to ensure that the relative second half energy output, both physically and mentally toward the game, could diminish during the second half of play. This idea could also be supported by the fact that during the second half of play no group was significantly more mobile (or travelled further) on one

field size when compared with the results from the games played on the other field. The combined eight and nine year old distance travelled scores showed significantly higher in the first half for games played on the regulation size soccer field. But in the second half of the same study games there was no significant difference in the distance travelled between results from the two field sizes. Perhaps the boys playing on the regulation size soccer field became too tired physically after the first half of play, or perhaps ther interest in the game dropped and they became less highly motivated to move at a rate higher than that displayed on the scaled down field.

Results Related to Subject Interviews

TABLE VII

INTERVIEW RESPONSE GROUPINGS

	Response Patterns	
	Eight Year Old Boys	Nine Year Old Boys
Question #2	4 boys - three years of organized soccer	3 boys - two years of organized soccer
	2 boys - two years of organized soccer	1 boy - four years of organized soccer
		1 boy - one year of organized soccer
		1 boy - no previous experience in league play.
Question #3	3 boys - soccer	4 boys - soccer
	1 boy - soccer and lacrosse	1 boy - hockey
	1 boy - baseball	1 boy - bowling
	1 boy - basketball	
Question #4	6 boys - yes	6 boys - yes
Question #5	3 boys - no	3 boys - yes
	2 boys - yes	2 boys - probably
	1 boy - no response	1 boy - no response
Question #6	3 boys - the large field	4 boys - the large field
	3 boys - the small field	2 boys - the small field
Question #7	4 boys - large, because it is easier to score goals.	3 boys - the large, because it's easier to score.
	2 boys - small, because it is harder to score.	3 boys - the small, because it's harder to score.
Question #8	3 boys - liked eleven-a-side better	4 boys - liked eleven-a-side better
	3 boys - liked eight-a-side better	2 boys - liked eight-a-side better
Question #9	5 boys - "no"	5 boys - "no"
	1 boy - didn't like the small field setup	1 boy - didn't like playing with bigger boys.
Question #10	5 boys - the big field	4 boys - liked the big field
	1 boy - the small field	1 boy - the small field
		1 boy - had fun on both fields.

*N = 6 IN ALL CASES

(SEE APPENDIX III)

Discussion of Interview Responses

The responses of the subjects seemed fairly evenly divided between support of the scaled down soccer games and the regulation size soccer games. It was felt that the past experience of the boys with regulation size soccer games could be a major contributing factor for the substantial subject support of this type of soccer game, as there was slightly more support for the large field expressed by the boys.

Perhaps if the past experience of the boys had been equal participation on both field sizes, then their support of the small field might have been more vigorous.

It was also felt that the goals used for the scaled down soccer games were too small, making it very difficult for boys to score goals or shoot successfully on goal. If a slightly larger goal were used perhaps the boys' attitude toward the scaled down games would have been more positive.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to determine whether there was any difference in the number of touches, possession time with the ball, and distance travelled by eight and nine year old boys during soccer games played on a scaled down soccer field, when compared to games played on a regulation size soccer field. Also an attempt was made to discover if there were any attitude changes in the boys following a series of games played on the two different sized soccer fields.

Three hypotheses were presented, and all of them were in the null hypothesis form. They stated that if eight and nine year old boys played study soccer games on two different field sizes (a scaled down soccer field and a regulation size soccer field), then there were be no significant differences in the number of touches, possession time with the ball, and distance travelled that were recorded on each different field size.

Forty-four subjects were used for the study (twenty-two eight year old boys, and twenty-two nine year olds.) Six boys from each group were randomly chosen for observation throughout the study. Each group played one pilot study game, and four study games. Two of the study games were played on the scaled down soccer field and two games were played on a regulation size soccer field. Two boys out of each group of six subjects were randomly selected again and wore pedometers during each study game. Also, each subject was

interviewed after the last study game, in order to determine the attitude of the subjects to the experimental games.

The major apparatus used in the study were seven stop watches, seven recording booklets, two "K & R Pedo" pedometers, a whistle, eleven red player bibs, and a cassette recorder and tape.

The mean scores from the recorded number of touches, possession time with the ball, and distance travelled for each game were analyzed for significance. First half and second half scores were also tested for significance. The t test analysis form was used, and it was a two-tailed test with the level of confidence chosen at .05.

Results indicated that there were significantly more touches of the ball by eight year olds, and eight and nine year old boys combined when they played on the scaled down field, compared to the number of touches they made when playing on a regulation size soccer field. There also was significantly longer possession time with the ball demonstrated by nine year old boys and eight and nine year old boys combined when they played study games on the scaled down soccer field, than when they played study games on the regulation size soccer field. There was no significant difference in the distance travelled between games played on the scaled down soccer field when compared to games played on the regulation size soccer field.

After analysis of first and second half data, it was apparent that the results from the games played on the scaled down soccer field were significantly more powerful during the second half of study games, when compared with results from the regulation size soccer field. The only incident in the study when the regulation

size soccer field was significantly more powerful than the scaled down soccer field, was in the distance travelled (both eight and nine year old boys combined) in the first half of the study games.

The interview response appeared to be fairly evenly distributed among the eight year old boys. Approximately three boys supported the scaled down field, and the rest supported the large field. The majority of nine year olds seemed to prefer the large soccer field.

Conclusions

On the basis of the results obtained and within the limitations of the design and the techniques of data collection, the following conclusions were drawn from the primary analysis.

(1) There did appear to be a significantly greater number of touches recorded from the games played on the scaled down soccer field, than were recorded from the games played on the regulation size soccer field.

(2) There was, in general, a significantly greater mean time period for possesssion of the ball recorded from the study games played on the scaled down soccer field, than the possession time recorded from study games played on the regulation size soccer field.

(3) There did not seem to be any significant difference between the distance travelled while playing study games on the scaled down soccer field, when compared to the distance travelled while playing on the regulation size soccer field. There was, however, a significantly greater mean score of eight and nine year old boys combined for distance travelled during the first half of study games.

while playing on the regulation size soccer field, when compared with the distance travelled by the eight and nine year old boys combined when playing on the scaled down soccer field.

(4) Eight and nine year old boys seemed evenly divided upon preference of the regulation size soccer games, or the scaled down soccer games. For both eight and nine year old boys, the responses were slightly more numerous in support of the regulation size soccer game. Whether the attitudes of these boys to the different field sizes were predominently influenced by past association with sport, by peer and/or adult influence, or by personal experience during the study games was difficult to determine.

Recommendations for Further Study

In order to assist individuals who may be interested in pursuing further study in this particular area of childrens' sport, the following recommendations are being made:

(1) A study of the same age group (eight and nine years of age), using basically the same design as the preceding thesis, but utilizing a larger sample size and having more study games. Very thorough screening of observers would be useful. Also more pedometers of a more precise nature could possibly increase the validity of the study.

(2) A study (longitudinal if possible) concerning the effects of simplifying soccer rules and scaling down of the soccer field on the attitudes of eight and nine year old boys. One rule in particular which could be eliminated for the experimental group could be the off-side rule, a very complex and advanced rule that

could possibly be a source of frustration to a lot of young soccer players.

(3) A longitudinal study to try to determine the effect that various different types of soccer coaching behaviours will have on the attitudes of young boys to the sport of soccer.

BIBLIOGRAPHY

Best, G. On the Ball. London: Pelham Books Limited, 1970.

Ellis, M. "Let's Develop Everybody's Skill!" Quest, 2(3), 14-17, 1973.

Glassford, G., and Clumpner, R. "Physical Culture Inside the People's Republic of China." Physical Education Around the World. Phi Epsilon Kapa Fraternity, Indianapolis 6.

Glassford, G. "The Twenty Foot High Basketball Hoop." Quest, 2(3), 5-6, 1973.

Morrell, J. Rules, Facilities and Equipment for the Younger Athlete. Unpublished paper. University of Alberta. 1973.

Orlick, T.M. "Children's Sports - A Revolution is Coming", CAPHER Journal, 39(3), 12-13, 1973.

Orlick. T.M. "Sport in Red China, Friendship First - Competition Second", CAPHER Journal, 39(3), 21-22, 1973.

Scott, H. Personal Interview, December 9, 1973.

Singer, R.N. Coaching, Athletics, and Psychology. New York: McGraw Hill Company, 1972.

Smith, M. "Adults in Kid's Sport", Clinic Notes, B.C. Federation of School Athletic Associations, 1-6, 1972.

Usher, P. The Long, Short, and Tall of it All. Unpublished Paper. University of Alberta, 1972.

Wade, A. Coaching Yourself Association Football. London: Educational Publications Limited, 1970.

Williams, R. Rugby for Beginners. London: Souvenir Press Ltd., 1973.

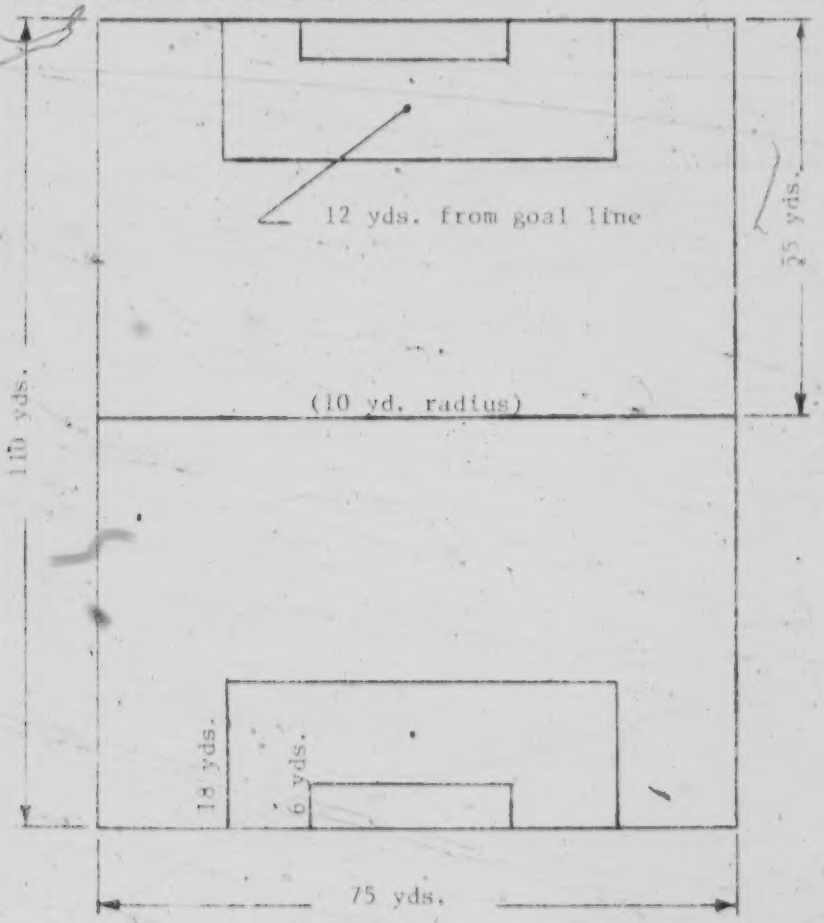
APPENDIX I

STUDY SOCCER FIELDS

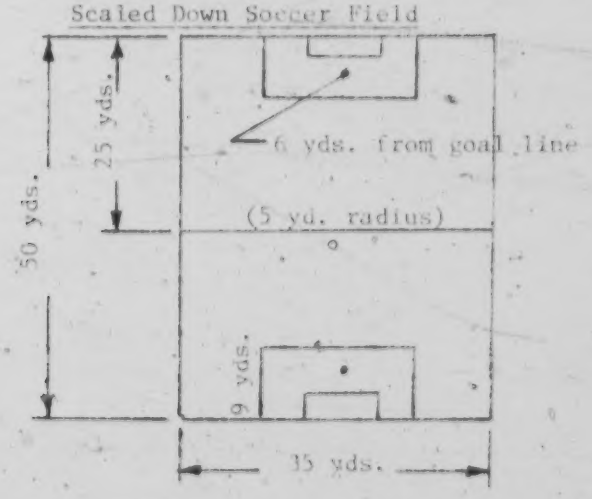
APPENDIX I

STUDY SOCCER FIELDS

Regulation Size Soccer Field



Scaled Down Soccer Field



APPENDIX II

RECORDING SHEET

APPENDIX II

RECORDING SHEET

Recorder: _____ Date: _____

Age Group: _____ Subject: _____

Field Size: _____

Touches	Possession
1st Half	1st Half
2nd Half	2nd Half
1st Half - 2nd Half - Total -	1st Half - 2nd Half - Total -

Comments -

APPENDIX III

INDIVIDUAL INTERVIEW RESPONSES

Questionnaire Responses

Subject	Question #1	Question #2	Question #3	Question #4	Question #5
Subject #1	Eight	Three	Soccer	Yes	No
Subject #2	I am Eight	Two years	Basketball	Yes	(Missed by the recorder)
Subject #3	Eight	Three	Soccer	Yes	Yes
Subject #4	I am eight	Two	Soccer	Yes	Yes I do
Subject #5	Eight	Three years	Baseball	Yes	No
Subject #6	Eight	Well, I played three years in the winter, and two years in the summer (just summer soccer school)	Lacrosse and soccer. They are both my favorite.	Yes	No
Subject #7	Nine	I couldn't, no	Soccer	Yes	(Missed by the recorder)
Subject #8	Nine	Two years	Soccer	Yes, I did.	Yes
Subject #9	Nine	Well, I played on a little league at Hampton and last year I played on a team, a Gorge team.	Soccer	Yes	Probably a little bit.
Subject #10	Nine	Um, about four	Bowling	Yes	I suppose so.
Subject #11	Nine	Only one I think..yeah, one	Hockey, I think, but I haven't played it yet.	Yes, I did very much.	Ah, quite a bit I think.
Subject #12	Nine	Two	Soccer	Yes	Yes

Questionnaire Responses

Subject	Question #6	Question #7	Question #8	Question #9	Question #10
Subject #1	The biggest field.	The big. You've got a wider shot to shoot at.	Eleven-a-side 'cause there's more players and you can get more players off and on.	No	The biggest, 'cause its wider and you can run around a lot.
Subject #2	On the small field.	The small one. 'Cause you can save the ball easier with a small goal.	Eleven because its ... well you can play a better game I think with eleven players, than eight.	No	Small, because its easier to win.
Subject #3	The big field.	The big one. You can score more goals.	Eleven men on my team. You can pass to more people.	No	The big field. You get more passes.
Subject #4	I think the little one ... yeah, because it isn't so hard to run on.	The small one, because then it's harder to score.	Eight, um...I guess I just think it's better.	No.	The big one ... um.. well you get to run around more.
Subject #5	The little one.	The big one, 'cause you can score more goals.	Eight-a-side. Because it's more easier.	No	The big one. Cause you get to run around more.

Questionnaire Responses

Subject	Question #6	Question #7	Question #8	Question #9	Question #10
Subject #6	The big field.	The big one. Because all of my shots are wide and you need the big goal to put them in.	Eight, because I don't like too much people because when there's a lot of people they get crowded up and everything. It just gets in a jam.	The small ball on one of the games, the small nets and the small fields I had to play on. 'Cause I like bigger fields 'cause I can have more breakaways, and bigger balls I can kick farther and put them in easier ... and that's about all.	The big field because its just easier. Somehow it's way easier, because I'm bigger and the field's bigger.
Subject #7	The big one.	Um, the big one 'cause you get more places to shoot.	Eleven-a-side I think. Cause it's more fun and they pass it to you more.	No.	The big one 'cause it's bigger and I can run faster and get more space.
Subject #8	The big one.	The small, because you can't score easier.	Eight teammates.	No.	The big one. Because you can run more.
Subject #9	Well, probably ...I guess the big one.	The bigger one because you have more room to shoot the ball in.	I like eleven teammates more 'cause there's more teammates to pass to.	No.	The big field because you have more room to run around in.

Questionnaire Responses

Subject	Question #6	Question #7	Question #8	Question #9	Question #10
Subject #10	The big one.	Well, the big one you get to have a better shoot, but the small one, um.. sometimes there's people crowded in so you -like you only get to have the ball for two minutes - two seconds, something like that. I think the big one's OK. It's bigger to shoot for.	I think eleven men's better. You have a whole team, and then you know how to pass..y'know, like if you have a small field then you think there's a wing and you go pass and there's some guy on the other team that just comes up and takes it.	No.	The big one. Well, it gives you more room to take the ball.
Subject #11	Probably the small one.	Well I wasn't quite sure about that because the small one was harder to get it in, but I like the big goal better, because it was easier to shoot and score.	I'd rather play eleven-a-side. Well you have more chance of passing and getting it in goals and stuff..	No, not that I can think of, except maybe some of the bigger guys that played.	Well I wasn't quite sure. I like the little field because you could run less, but the big field was easier to pass and you had more room.
Subject #12	Um..the small one.	Um, the small. Because its easier to score on it for me.	Eight-a-side. Well, there's not as many people and it's easier to play that way.	No.	The small. Well, it was easier to play on and I didn't have as much trouble getting the ball and everything.

Interview Questions

1. How old are you now?
2. How many years have you been playing organized soccer?
3. Which sport do you enjoy playing the most?
4. Did you enjoy playing these five soccer games here?
5. Do you think that you improved over the five games?
6. On which field did you play your best soccer?
7. Which goal size did you like the best? Why?
8. Do you like playing eight-a-side, or eleven-a-side best? Why?
9. Was there anything that you didn't like about these games? What?
10. Which field did you enjoy playing on the most? Why?

APPENDIX IV

SCHEDULE OF STUDY GAMES

SCHEDULE OF STUDY GAMES

1. Pilot Game

Tuesday, Aug. 7

Age	Time	Field Size
8 Year Old Boys	7:00-8:00 pm	Small
9 Year Old Boys	8:10-9:10 pm	Small

2. Study Game #1

Thursday, Aug. 9

Age	Time	Field Size
8 Year Old Boys	7:00-8:00 pm	Large
9 Year Old Boys	8:10-9:10 pm	Small

3. Study Game #2

Tuesday, Aug. 14

Age	Time	Field Size
8 Year Old Boys	7:00-8:00 pm	Small
9 Year Old Boys	8:10-9:10 pm	Large

4. Study Game #3*

Tuesday, Aug. 21

Age	Time	Field Size
8 Year Old Boys	7:00-8:00 pm	Large
9 Year Old Boys	8:10-9:10 pm	Small

5. Study Game #4

Thursday, Aug. 23

Age	Time	Field Size
8 Year Old Boys	7:00-8:00 pm	Small
9 Year Old Boys	8:10-9:10 pm	Large

*Study Games Scheduled for Thursday, August 16 were Postponed Due to Rain.

APPENDIX V

INDIVIDUAL SCORE TOTALS FOR ALL STUDY GAMES

APPENDIX V

INDIVIDUAL SCORE TOTALS FOR ALL STUDY GAMES

A. EIGHT YEAR OLD BOYS

Subject Number One

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	43	23	66	54	42	96
	Possession (Seconds)	77.3	74.2	151.5	112.7	62.2	174.9
	Distance Travelled (Miles)	1.938	2.562	4.5	1.75	2.25	4.0*
TEST #2	Number of Touches	34	31	65	45	39	84
	Possession (Seconds)	46.2	51.0	97.2	51.3	49.9	101.2
	Distance Travelled (Miles)	2.25	2.75	4.0	2.125	2.125	4.250

* It was felt that the pedometer (due to some mechanical defect) was not registering accurately on the day of measuring TEST #1 - SMALL FIELD. A new pedometer of the same model was substituted for all remaining study games.

Subject Number Two

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	15	6	21	25	26	51
	Possession (seconds)	7.1	7.4	14.5	16.8	19.0	35.8
	Distance Travelled (Miles)	2.063	1.687	3.75	1.50	3.375	4.875
TEST #2	Number of Touches	2	5	7	26	14	40
	Possession (seconds)	.4	1.1	1.5	49.8	8.0	57.8
	Distance Travelled (Miles)	1.375	1.625	3.0	1.625	1.125	2.750

Subject Number Three

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	12	7	19	-	-	-
	Possession (seconds)	7.5	3.0	10.5	-	-	-
TEST #2	Number of Touches	15	13	28	26	19	45
	Possession (seconds)	14.5	17.0	31.5	13.0	47.3	60.3

Subject Number Four

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	12	7	19	9	9	18
	Possession (Seconds)	6.9	2.9	9.8	9.8	4.8	14.6
TEST #2	Number of Touches	17	4	21	11	7	18
	Possession (seconds)	14.2	1.2	15.4	6.6	9.1	15.7

Subject Number Five

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	14	14	28	22	18	40
	Possession (seconds)	58.1	43.6	101.7	36.8	24.7	61.5
TEST #2	Number of Touches	42	4	16	17	18	35
	Possession (seconds)	6.3	1.1	7.4	15.7	11.2	26.9

Subject Number Six

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	28	22	50	49	44	93
	Possession (seconds)	48.8	19.8	68.6	41.4	49.1	90.5
TEST #2	Number of Touches	36	20	56	34	31	65
	Possession (seconds)	26.0	47.5	73.5	66.4	58.0	124.4

B. NINE YEAR OLD BOYS

Subject Number Seven

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	18	33	51	25	41	66
	Possession (seconds)	27	35.5	62.5	19.7	70.5	90.2
	Distance Travelled (miles)	1.875	3.75	5.625	2.625	2.938	5.563
TEST #2	Number of Touches	31	17	48	27	39	66
	Possession (seconds)	56.2	10.6	66.8	24.2	64.2	88.4
	Distance Travelled (miles)	3.375	3.0	6.375	2.125	2.675	4.80

Subject Number Eight

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	28	34	62	35	26	61
	Possession (seconds)	70.6	61.0	131.6	60.5	49.5	110
	Distance Travelled (miles)	2.375	2.125	4.50	2.875	3.250	6.125
TEST #2	Number of Touches	34	33	67	44	41	85
	Possession (seconds)	75.0	15.0	90.0	84.0	55.0	139.0
	Distance Travelled (miles)	3.75	3.25	7.0	2.625	2.375	5.0

Subject Number Nine

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	44	21	65	53	52	105
	Possession (seconds)	47.0	71.0	118.0	30.8	14.8	45.6
TEST #2	Number of Touches	25	28	53	41	60	101
	Possession (seconds)	18.0	15.0	33.0	29.5	125.5	155.0

Subject Number Ten

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	9	16	25	19	18	37
	Possession (seconds)	17.2	25.6	42.8	51.1	14.5	65.6
TEST #2	Number of Touches	20	11	31	15	40	55
	Possession (seconds)	45.0	28.6	73.6	22.7	69.6	92.3

Subject Number Eleven

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	10	4	14	15	20	35
	Possession (seconds)	6.2	5.6	11.8	19.0	23.6	42.6
TEST #2	Number of Touches	-	-	-	3	1	4
	Possession (seconds)	-	-	-	1.0	.6	1.6

Subject Number Twelve

		Large Field			Small Field		
		1st Half	2nd Half	Total	1st Half	2nd Half	Total
TEST #1	Number of Touches	12	4	16	8	9	17
	Possession (seconds)	12.4	6.99	19.3	10.0	13.8	23.8
TEST #2	Number of Touches	16	5	21	9	9	18
	Possession (seconds)	25.0	12.0	37.0	21.5	8.2	29.7

APPENDIX VI

RECORD OF STUDY GAME SCORES

APPENDIX VI

RECORD OF STUDY GAME SCORES

		8 Year Old Boys		9 Year Old Boys	
		Reds	Whites	Reds	Whites
1. Aug. 9	1st Half	2	3	1	1
	Total	2	6	1	2
2. Aug. 14	1st Half	2	2	1	3
	Total	4	5	3	5
3. Aug. 21	1st Half	3	3	0	3
	Total	5	9	1	3
4. Aug. 23	1st Half	1	5	0	2
	Total	3	9	0	4

APPENDIX VII

t SCORE CALCULATIONS

APPENDIX VII

t SCORE CALCULATIONS

A. Number of Touches

1. Eight Year Old Boys

	Small Field	Large Field	D*	D²**
Subject #1	90.0	65.5	+24.5	600.25
Subject #2	45.5	14.0	+31.5	992.25
Subject #3	45.0	23.5	+21.5	462.25
Subject #4	18.0	20.0	- 2.0	4.0
Subject #5	37.5	22.0	+15.0	225.0
Subject #6	79.0	53.0	+26.0	676.0
			116.50	2959.75

* Difference between Mean Scores
** Difference between Mean Scores Squared

$$t = \frac{D}{\frac{N D^2 - (D)^2}{N - 1}} = \frac{116.5}{\frac{6 \times 2959.75 - (116.5)^2}{6 - 1}}$$

$$= \frac{116.5}{\frac{177.58 - 13572.25}{5}} = \frac{116.5}{28.935} = 4.0263$$

t 5 degrees of freedom at the .05 level of confidence is 2.57.

2. Nine Year Old Boys

	Small Field	Large Field	D*	D²**
Subject #7	66.0	49.5	+16.5	272.25
Subject #8	73.0	64.5	+ 8.5	72.25
Subject #9	103.0	59.0	+44.0	1936.0
Subject #10	46.0	28.0	+18.0	324.0
Subject #11	19.5	14.0	+ 5.5	30.25
Subject #12	17.5	18.5	- 1.0	1.0
			91.5	2634.75

$$t = \frac{91.5}{\frac{6X2634.75 - (91.5)^2}{5}} = \frac{91.5}{\frac{15814.5 - 8372.25}{5}}$$

$$= \frac{91.5}{38.5804} = 2.37167$$

t 5 degrees of freedom is 2.57.

3. All Boys

	Small Field.	Large Field	D	D^2
Subject #1	90.0	65.5	+24.5	600.25
Subject #2	45.5	14.0	+31.5	992.25
Subject #3	45.0	23.5	+21.5	462.25
Subject #4	18.0	20.0	- 2.0	4.0
Subject #5	37.5	22.0	+15.0	225.0
Subject #6	79.0	53.0	+26.0	676.0
Subject #7	66.0	49.5	+16.5	272.25
Subject #8	73.0	64.5	+8.5	72.25
Subject #9	103.0	59.0	+44.0	1936.0
Subject #10	46.0	28.0	+18.0	324.0
Subject #11	19.5	14.0	+ 5.5	30.25
Subject #12	17.5	18.5	- 1.0	1.0
			208.0	5594.50

$$t = \frac{208}{\frac{12 \times 5594.50 - (208)^2}{12 - 1}} = \frac{208}{\frac{67134 - 43264}{11}}$$

$$+ \frac{208}{78.1223} = 2.6625$$

t 11 degrees of freedom is 2.179.

B. Possession of the Ball

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	138.05	124.35	+13.7	187.69
Subject #2	46.80	8.0	+38.8	1505.44
Subject #3	60.3	21.0	+39.3	1544.49
Subject #4	15.15	12.6	+ 2.55	6.50
Subject #5	44.20	54.55	-10.35	107.12
Subject #6	107.45	71.05	+36.40	1324.96
			120.40	4676.20

$$t = \frac{D}{\frac{N D^2 - (D)^2}{N - 1}} = \frac{120.40}{\frac{6 \times 4676.20 - 14496.16}{5}}$$

$$= \frac{120.40}{52.0789} = 2.3119$$

t 5 degrees of freedom (at the .05 level of confidence) is 2.57.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	89.30	64.65	+24.65	607.62
Subject #8	124.5	110.80	+13.70	187.69
Subject #9	100.3	75.5	+24.8	615.04
Subject #10	78.95	58.2	+20.75	430.56
Subject #11	22.10	11.8	+10.30	106.09
Subject #12	26.75	28.15	- 1.40	1.96
			92.8	1948.96

$$t = \frac{92.8}{\frac{6X1948.96 - (92.8)^2}{5}} = \frac{92.8}{\frac{11693.76 - 8611.84}{5}}$$

$$= \frac{92.8}{24.827} = 3.7379$$

t 5 degrees of freedom (at the .05 confidence level) is 2.57.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	138.05	124.35	+13.7	187.69
Subject #2	46.80	8.0	+38.8	1505.44
Subject #3	60.3	21.0	+39.3	1544.49
Subject #4	15.15	12.6	+ 2.55	6.50
Subject #5	44.20	54.55	-10.35	107.12
Subject #6	107.45	71.05	+36.40	1324.96
Subject #7	89.30	64.65	+24.65	607.62
Subject #8	124.5	110.80	+13.70	187.69
Subject #9	100.3	75.5	+24.8	615.04
Subject #10	78.95	58.2	+20.75	430.56
Subject #11	22.10	11.8	+10.30	106.09
Subject #12	26.75	28.15	- 1.4	1.96
			213.20	6625.16

$$t = \frac{213.2}{\frac{12X6625.16 - (213.2)^2}{11}} = \frac{213.2}{\frac{79501.92 - 45454.24}{11}}$$

$$= \frac{213.2}{55.6349} = 3.8321$$

t 11 degrees of freedom (at the .05 level of confidence) is 2.201.

C. Distance Travelled

Significance Tabulations

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	4.125	4.25	-.125	.015625
Subject #2	3.8125	3.375	+.438	.191844

$$t = \frac{.313}{\frac{2X.207469-(.313)^2}{1}} = \frac{.313}{\frac{.414938 - .097969}{1}}$$

$$= \frac{.313}{.563} = .5559$$

The t score for significance at the .05 level of confidence is (for one degree of freedom) 12.706.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	5.183	6.0	-.818	.669124
Subject #8	5.563	5.75	-.187	.034969

$$t = \frac{1.005}{\frac{2X.704093 - (1.005)^2}{1}} = \frac{1.005}{\frac{1.408186 - 1.010025}{1}}$$

$$= \frac{1.005}{.631} = 1.5927$$

The t score for significance at 1 degree of freedom (at the .05 level of confidence) is 12.706.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	4.125	4.25	-.125	.015625
Subject #2	3.813	3.375	+.438	.191844
Subject #7	5.182	6.0	-.818	.669124
Subject #8	5.563	5.75	-.187	.034969
			.692	.911562

$$t = \frac{.692}{\frac{4X.011562 - (.692)^2}{4-1}} = \frac{.692}{\frac{3.646248 - .478864}{3}}$$

$$= \frac{.692}{1.0275} = .5839$$

t score at 3 degrees is 3.182.

t SCORE ANALYSIS OF FIRST HALF RESULTS

A. Number of Touches

Significance Tabulations

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	49.5	38.5	+11.0	121.
Subject #2	25.5	8.5	+17.0	289.
Subject #3	26.0	13.5	+12.5	156.25
Subject #4	10.0	14.5	- 4.5	20.25
Subject #5	19.5	13.0	+ 6.5	42.25
Subject #6	41.5	32.0	+ 9.5	90.25
			52	719.0

$$t = \frac{52}{\frac{6X719. - (52)^2}{5}} = \frac{52}{\frac{4314 - 2704}{5}}$$

$$= \frac{52}{17.944} = 2.8979$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	26.0	24.5	+1.5	2.25
Subject #8	39.5	31.0	+8.5	72.25
Subject #9	47.0	34.5	+12.5	156.25
Subject #10	17.0	14.5	+2.5	6.25
Subject #11	9.0	10.0	-1.0	1.0
Subject #12	8.5	14.0	-5.5	30.25
			18.5	268.25

$$t = \frac{18.5}{\frac{6X268.25 - (18.5)^2}{5}} = \frac{18.5}{\frac{1609.5 - 342.25}{5}}$$

$$= \frac{18.5}{15.9201} = 1.1621$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	49.5	38.5	+11.0	121.
Subject #2	25.5	8.5	+17.0	289.
Subject #3	26.0	13.5	+12.5	156.25
Subject #4	10.0	14.5	- 4.5	20.25
Subject #5	19.5	13.0	+ 6.5	42.25
Subject #6	41.5	32.0	+ 9.5	90.25
Subject #7	26.0	24.5	+ 1.5	2.25
Subject #8	39.5	31.0	+ 8.5	72.25
Subject #9	47.0	34.5	+12.5	156.25
Subject #10	17.0	14.5	+ 2.5	6.25
Subject #11	9.0	10.0	- 1.0	1.0
Subject #12	8.5	14.0	- 5.5	30.25
			70.5	987.25

$$t = \frac{70.5}{\frac{12X987.25 - (70.5)^2}{11}} = \frac{70.5}{\frac{11847.0 - 4970.25}{11}}$$

$$= \frac{70.5}{25.0032} = 2.8196$$

The t score for significance at the .05 level of confidence for 11 degrees of freedom is 2.201.

B. Possession of the Ball

Significance Tabulations

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	82.0	61.75	+20.25	410.0625
Subject #2	33.3	3.75	+29.55	873.2025
Subject #3	13.0	11.0	+ 2.0	4.0
Subject #4	8.2	10.5	- 2.3	5.29
Subject #5	26.25	32.2	- 5.95	35.4025
Subject #6	53.9	37.4	+16.5	272.25
			60.05	1600.2075

$$t = \frac{60.05}{\frac{6X1600.2075-(60.05)^2}{5}} = \frac{60.05}{\frac{9601.245-3606.0025}{5}}$$

$$= \frac{60.05}{34.6273} = 1.7342$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	21.95	41.6	-19.65	3861.1225
Subject #8	72.35	72.8	.45	.2025
Subject #9	30.15	32.5	- 2.35	5.5225
Subject #10	36.9	31.1	+ 5.80	33.64
Subject #11	10.0	6.2	+ 3.80	14.44
Subject #12	15.75	18.7	- 2.95	8.7025
			15.80	3923.630

$$t = \frac{15.80}{\frac{6X3923.63-(15.80)^2}{5}} = \frac{15.80}{\frac{23541.78-249.64}{5}}$$

$$= \frac{15.80}{68.25268} = 0.23149$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	92.0	61.75	+20.25	410.0625
Subject #2	33.3	3.75	+29.55	873.2025
Subject #3	13.0	11.0	+ 2.0	4.0
Subject #4	8.2	10.5	- 2.3	5.29
Subject #5	26.25	32.2	- 5.95	35.4025
Subject #6	53.9	37.4	+16.5	272.25
Subject #7	21.95	41.6	-19.65	3861.1225
Subject #8	72.35	72.8	- .45	.2025
Subject #9	30.15	32.5	- 2.35	5.5225
Subject #10	36.9	31.1	+ 5.80	33.64
Subject #11	10.0	6.2	+ 3.80	14.44
Subject #12	15.75	18.7	- 2.95	8.7025
			44.25	5523.8375

$$t = \frac{44.25}{\frac{12X5523.8375-(44.25)^2}{11}} = \frac{44.25}{\frac{66286.05 - 1958.0625}{11}}$$

$$= \frac{44.25}{76.47221} = .057864$$

The t score for significance at the .05 level of confidence (for 11 degrees of freedom) is 2.201.

C. Distance Travelled

Significance Tabulation

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	1.9375	2.094	-.1565	.02449
Subject #2	1.5625	1.719	-.1565	.02449
			.313	.04898

$$t = \frac{.313}{\frac{2X.04898-(.313)^2}{1}} = \frac{.313}{\frac{0.09796 - .09797}{1}}$$

The above formula requires taking the square root of a negative number, which is meaningless for our purposes. If one assumes that 0.09796 and 0.09797 are close enough to be considered the same, then the equation requires dividing by zero, which is again meaningless.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	2.375	2.625	-.25	0.0625
Subject #8	2.75	3.063	-.313	0.098
			.563	.1605

$$t = \frac{.563}{\frac{2X.1605-(.563)^2}{1}} = \frac{.563}{\frac{.3210-.317}{1}}$$

$$= \frac{.563}{0.0632} = \frac{.8908}{.59028} = 1.509$$

The t score for significance at the .05 level of confidence (for one degree of freedom) is 12.706.

1. All Boys

	Small Field	Large Field	D	D^2
Subject #1	1.937	2.094	-.1565	.02449
Subject #2	1.5625	1.719	-.1565	.02449
Subject #7	2.375	2.625	-.25	0.0625
Subject #8	2.75	3.063	-.313	0.098
			-.876	0.20948

$$t = \frac{.876}{\frac{4X.20948 - (.876)^2}{3}} = \frac{.876}{\frac{0.83792 - .7674}{3}}$$

$$t = \frac{.876}{.1533} = 5.71428$$

The t score for significance at the .05 level of confidence (for 3 degrees of freedom) is 3.182.

t SCORE ANALYSIS OF SECOND HALF RESULTS

A. Number of Touches

Significance Tabulations

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	40.5	27.0	+13.5	182.25
Subject #2	13.5	5.5	+ 8.0	64.0
Subject #3	19.0	10.0	+ 9.0	81.0
Subject #4	8.0	5.5	+ 2.5	6.25
Subject #5	18.0	9.0	+ 9.0	81.0
Subject #6	37.5	21.0	+16.5	272.25
			58.5	686.75

$$t = \frac{58.5}{\frac{6X686.75 - (58.5)^2}{5}} = \frac{58.5}{\frac{4120.5 - 3422.25}{5}}$$

$$= \frac{58.5}{11.8174} = 4.950$$

The t score for significance at the .05 level of confidence is 2.571 (for 5 degrees of freedom).

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	40.0	25.0	+15.0	225.0
Subject #8	33.5	33.5	-	-
Subject #9	56.0	24.5	+31.5	992.25
Subject #10	29.0	13.5	+15.5	240.25
Subject #11	10.5	4.0	+6.5	42.25
Subject #12	9.	4.5	+4.5	20.25
			73.0	1520.0

$$t = \frac{73}{\frac{6X1520 - (73)^2}{5}} = \frac{73}{\frac{9120.0 - 5329}{5}}$$

$$= \frac{73}{27.535} = 2.651$$

The t score at the .5 level of significance (for 5 degrees of freedom) is 2.571.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	40.5	27.0	+13.5	182.25
Subject #2	13.5	5.5	+ 8.0	64.0
Subject #3	19.0	10.0	+ 9.0	81.0
Subject #4	8.0	5.5	+ 2.5	6.25
Subject #5	18.0	9.0	+ 9.0	81.0
Subject #6	37.5	21.0	+16.5	272.25
Subject #7	40.0	25.0	+15.0	225.0
Subject #8	33.5	33.5	-	-
Subject #9	56.0	24.5	+31.5	992.25
Subject #10	29.0	13.5	+15.5	240.25
Subject #11	10.5	4.0	+ 6.5	42.25
Subject #12	9.0	4.5	+ 4.5	20.25
			131.5	2206.75

$$t = \frac{131.5}{\frac{12 \times 2206.75 - (131.5)^2}{11}} = \frac{131.5}{\frac{26481 - 17292.25}{11}}$$

$$= \frac{131.5}{28.902} = 4.5498$$

The t score for significance at the .05 level of confidence is 2.201 (for 11 degrees of freedom).

B. Possession of the Ball

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	56.05	62.6	-6.55	42.903
Subject #2	13.5	4.25	+9.25	85.563
Subject #3	47.3	10.0	+37.3	1391.29
Subject #4	6.95	2.05	+ 4.9	24.01
Subject #5	17.95	22.35	- 4.4	19.36
Subject #6	53.55	33.65	+19.90	396.01
			60.04	1959.136

$$t = \frac{60.4}{\frac{6X1959.136-(60.4)^2}{5}} = \frac{60.4}{\frac{11754.816 - 3648.16}{5}}$$

$$= \frac{60.4}{40.2658} = 1.50$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	67.35	23.05	+44.3	1962.49
Subject #8	50.45	38.0	+12.45	155.003
Subject #9	70.15	43.0	+27.15	737.123
Subject #10	42.05	27.1	+14.95	42.25
Subject #11	12.10	5.6	+ 6.5	42.25
Subject #12	11.0	9.495	+ 1.505	2.265
			106.855	3122.634

$$6 = \frac{106.855}{\frac{6X3122.634-(106.855)^2}{5}} = \frac{106.855}{\frac{18735.804 - 11417.991}{5}}$$

$$= \frac{106.855}{38.2565} = 2.793$$

The t score for significance at the .05 level of confidence (for 5 degrees of freedom) is 2.571.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	56.05	62.6	- 6.55	42.903
Subject #2	13.5	4.25	+ 9.25	85.563
Subject #3	47.3	10.0	+37.3	1391.29
Subject #4	6.95	2.05	+ 4.9	24.01
Subject #5	17.95	22.35	- 4.4	19.36
Subject #6	53.55	33.65	+19.9	396.01
Subject #7	67.35	23.05	+44.3	1962.49
Subject #8	50.45	38.0	+12.45	155.003
Subject #9	70.15	43.0	+27.15	737.123
Subject #10	42.05	27.1	+14.95	233.503
Subject #11	12.10	5.6	+ 6.5	42.25
Subject #12	11.0	9.4	+ 1.505	2.266
			167.255	5081.77

$$t = \frac{167.255}{\frac{12X5081.77-(167.255)^2}{11}} = \frac{167.255}{\frac{60981.24-27974.235}{11}}$$

$$= \frac{167.255}{54.778} = 3.053$$

The t score for significance at the .05 level of confidence (for 11 degrees of freedom) is 2.201.

C. Distance Travelled

1. Eight Year Old Boys

	Small Field	Large Field	D	D^2
Subject #1	2.25	2.562	-.313	.09734
Subject #2	2.125	2.75	-.625	.39063
			.937	.48797

$$t = \frac{.937}{\frac{2X.48797-(.937)^2}{1}} = \frac{.937}{\frac{.97594-.87797}{1}}$$

$$= \frac{.937}{0.313} = 2.99361$$

The t score for significance at the .05 level of confidence (for 1 degree of freedom) is 12.706.

2. Nine Year Old Boys

	Small Field	Large Field	D	D^2
Subject #7	2.807	3.375	-.568	.32262
Subject #8	2.813	2.688	+.125	.01563
			.443	.33825

$$t = \frac{.443}{\frac{2X.33825-(.443)^2}{1}} = \frac{.443}{\frac{.6765-19625}{1}}$$

$$= \frac{.443}{.693} = .63925$$

The t score for significance at the .05 level of confidence (for 1 degree of freedom) is 12.706.

3. All Boys

	Small Field	Large Field	D	D^2
Subject #1	2.25	2.562	-.312	.09734
Subject #2	2.125	2.75	-.625	.39063
Subject #7	2.807	3.375	-.568	.32262
Subject #8	2.813	2.688	+.125	.01562
			-1.38	.82622

$$t = \frac{1.38}{\frac{4X.82622-(1.38)^2}{3}} = \frac{1.38}{\frac{3.30488 - 1.9044}{3}}$$

$$= \frac{1.38}{.6833} = 2.0196$$

The t score for significance at the .05 level of confidence (for 3 degrees of freedom) is 3.182.